

Patent Claims

1. Semiconductor laser chip having
- a semiconductor laser element and
 - a beam shaper integrated into the semiconductor laser chip and serving to shape a laser beam emitted by the semiconductor laser element,
 - the beam shaper being arranged in a manner integrated in the semiconductor laser element in the exit direction of a laser beam emitted by the semiconductor laser element, such that the emitted laser beam is guided through the beam shaper, the beam shaper having a predetermined concentration profile of oxidized aluminium.

2. Semiconductor laser chip according to Claim 1, in which the beam shaper is monolithically integrated in the semiconductor laser chip.

3. Semiconductor laser chip according to Claim 1 or 2, in which the beam shaper has aluminium-containing material.

4. Semiconductor laser chip according to Claim 3, in which the beam shaper has at least one material combination of at least one of the following material systems:
- indium gallium aluminium antimonide,
 - gallium aluminium arsenide antimonide, or
 - indium aluminium arsenide antimonide.

5. Semiconductor laser chip according to one of Claims 1 to 4, in which a trench is introduced between the semiconductor laser element and the beam shaper.

6. Semiconductor laser chip according to Claim 5, in which the trench has a width of at most 15 μm between the edge of the semiconductor laser element from which the laser beam is emitted and the beam-input-end surface of the beam shaper.

7. Semiconductor laser chip according to one of Claims 1 to 6, in which the semiconductor laser element is configured as a DFB semiconductor laser element.

8. Semiconductor laser chip according to one of Claims 1 to 6, in which the semiconductor laser element is configured as an FP semiconductor laser element.

9. Method for fabricating a semiconductor laser chip,

- in which a semiconductor laser element is formed,
- in which a beam shaper is formed in the exit direction of a laser beam emitted by the semiconductor laser element, in such a manner that the emitted laser beam is guided through the beam shaper,
- in which case, in order to form the beam shaper,
 - a beam shaper region is formed in the exit direction of a laser beam emitted by the semiconductor laser element, the beam shaper region containing aluminium,
 - a desired aluminium concentration profile is formed in the beam shaper region,
 - a selective oxidation of the beam shaper region is carried out, such that the beam shaper is formed depending on the aluminium concentration profile.

10. Method according to Claim 9, in which at least one material combination of at least one of the following material systems is used for the beam shaper region:

- indium gallium aluminium antimonide,
- gallium aluminium arsenide antimonide, or
- indium aluminium arsenide antimonide.

11. Method according to Claim 9 or 10, in which a trench is introduced between the semiconductor laser element and the beam shaper region or the beam shaper.

20230303 011703